

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please cancel Claims 3, 6, 7, 22, 23, and 43.

4 Please amend Claims 1, 5, 21, 29, 44, 45, 47 and 48; and add new Claims 49-53.

5 1. (Currently Amended) An air sensor device configured to collect airborne particles and to  
6 evaluate collected airborne particles in order to determine if the collected airborne particles indicate  
7 the presence of a biological threat, comprising:

8 a regenerable solid collection surface for supporting a spot of immobilized airborne  
9 particles, the regenerable solid collection surface being specifically configured to remove particles  
10 from an air stream by impaction of the air stream against the regenerable solid collection surface;

11 means for regenerating the regenerable solid collection surface by removing particles  
12 from the regenerable solid collection surface, such that once regenerated, the regenerable collection  
13 solid surface can collect additional particles from the air, such that particles collected before  
14 regenerating the regenerable solid collection surface are substantially no longer present to  
15 contaminate particles collected after regeneration; and

16 means for analyzing the spot of immobilized airborne particles while the particles  
17 remain disposed on the regenerable solid collection surface to determine if the spot of immobilized  
18 airborne particles represents a biological threat, said means for analyzing the spot of immobilized  
19 airborne particles comprising a fluorescence detector; and

20 an excitation light source configured to emit excitatory radiation that is directed  
21 towards the particles collected upon the regenerable solid collection surface, the excitatory radiation  
22 having a wavelength that excites any biomolecules comprising the particles to produce a fluorescence  
23 radiation to which the fluorescence detector responds.

24 2. – 3. (Canceled)

25 4. (Previously Presented) The device according to Claim 1, wherein the regenerable solid  
26 collection surface is part of an impaction plate.

27 5. (Currently Amended) The device according to ~~Claim 1~~ Claim 49, wherein the means for  
28 analyzing the spot of immobilized airborne particles is selected from the group consisting of a  
29 fluorescence detector, a Raman spectrometer, a Fourier transform infrared spectrometer, and a  
30 MALDI mass spectrometer.

1           6. - 20. (Canceled)

2           21. (Currently Amended) A method of detecting airborne biological particles, the method  
3 comprising:

4                 inertially impacting ~~depositing~~ airborne particles on a regenerable solid collection  
5 surface provided for supporting a spot of immobilized airborne particles, such that the particles  
6 deposited on the regenerable solid collection surface form a spot;

7                 measuring a biological signature present in the particles comprising the spot, using a  
8 detector configured for sensing the biological signature of the particles, while the particles remain  
9 deposited on the regenerable solid collection surface;

10                determining a concentration of the immobilized-airborne biological particles from the  
11 measurement of the biological signature in order to determine if the biological particles should be  
12 considered to represent a potential biological threat; and

13                regenerating the regenerable solid collection surface by removing particles from the  
14 regenerable solid collection surface, such that once thus regenerated, the regenerable solid collection  
15 surface can collect additional particles from the air, and such that particles collected before  
16 regeneration of the regenerable surface are substantially no longer present to contaminate particles  
17 collected after the regeneration.

18           22. – 23. Canceled)

19           24. (Previously Presented) The method according to Claim 21, wherein the biological  
20 signature is selected from the group consisting of a Raman spectrum, an infrared absorption  
21 spectrum, and a mass spectrum.

22           25. - 28. (Canceled)

23           29. (Currently Amended) The device according to ~~Claim 6~~ Claim 1, further comprising a  
24 dichroic mirror that substantially reflects the excitatory radiation and is substantially transparent to  
25 the fluorescence radiation emitted by the excited biomolecules, the dichroic mirror being positioned  
26 to reflect the excitatory radiation towards the particles deposited upon the regenerable solid collection  
27 surface.

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1           30. (Previously Presented) The device according to Claim 29, further comprising at least one  
2 element selected from the group consisting essentially of:

3                   (a)     an excitation filter disposed between the excitation light source and the  
4 dichroic mirror; and

5                   (b)     an emission filter disposed between the dichroic mirror and the fluorescence  
6 detector.

7           31. (Previously Presented) The device according to Claim 1, wherein the means for  
8 regenerating the regenerable solid collection surface comprises at least one element selected from the  
9 group consisting essentially of:

10                   (a)     a brush that regenerates the regenerable solid collection surface by brushing  
11 away particles that were collected on the regenerable solid collection surface;

12                   (b)     a pad that regenerates the regenerable solid collection surface by pressing  
13 against the regenerable solid collection surface while the pad and the regenerable solid collection  
14 surface move relative to each other, so as to remove particles that were collected on the regenerable  
15 solid collection surface; and

16                   (c)     a wheel coupled to a motor that regenerates the regenerable solid collection  
17 surface by pressing against the regenerable solid collection surface while the motor rotates the wheel,  
18 so as to remove particles that were collected on the regenerable solid collection surface.

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1           32. (Previously Presented) The device of Claim 1, wherein the means for regenerating the  
2 regenerative solid collection surface comprises at least one element selected from the group consisting  
3 essentially of:

4                   (a)     a nozzle configured to direct a stream of high velocity air towards the  
5 regenerative solid collection surface to dislodge the particles deposited thereon;

6                   (b)     a blade configured to scrape the regenerative solid collection surface to  
7 dislodge the particles deposited thereon;

8                   (c)     means for electrostatically charging the regenerative solid collection surface, so  
9 that a static charge disperses the particles that were deposited thereon;

10                  (d)     means for directing energy to the particles collected upon the regenerative solid  
11 collection surface to dislodge the particles deposited thereon; and

12                  (e)     means for directing energy to the regenerative solid collection surface to  
13 dislodge the particles deposited thereon.

14           33. (Previously Presented) The device of Claim 1, further comprising a liquid coating  
15 applicator configured to moisten the regenerative solid collection surface prior to collecting the  
16 particles, thereby enhancing a collection efficiency of the regenerative solid collection surface.

17           34. (Previously Presented) The device of Claim 1, further comprising a mechanical homing  
18 sensor that positions the regenerative solid collection surface relative to at least one additional  
19 component selected from the group consisting essentially of:

20                   (a)     a spotting nozzle configured to deposit a spot of particles on the regenerative  
21 solid collection surface;

22                   (b)     the means for analyzing the spot of immobilized airborne particles;

23                   (c)     the means for regenerating the regenerative solid collection surface; and

24                   (d)     a liquid coating applicator used to apply a liquid to the regenerative solid  
25 collection surface.

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1           35. (Previously Presented) The device of Claim 1, further comprising a processor configured  
2 to implement at least one function selected from the group consisting essentially of:

3                 (a)     producing an alarm signal if the means for analyzing the spot of immobilized  
4 airborne particles indicates that the particles collected on the regenerable solid collection surface are  
5 potentially harmful to biological organisms;

6                 (b)     activating at least one additional component if the means for analyzing the spot  
7 of immobilized airborne particles indicates that the particles collected on the regenerable solid  
8 collection surface are potentially harmful to biological organisms; and

9                 (c)     determine a concentration of biological particles collected on the regenerable  
10 solid collection surface, and to activate an alarm signal if the processor determines that the  
11 concentration of biological particles on the regenerable solid collection surface exceeds a  
12 predetermined value.

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1           36. (Previously Presented) The apparatus of Claim 1, further comprising a processor coupled  
2 to the means for analyzing the spot of immobilized airborne particles, the processor being logically  
3 configured to implement at least one function selected from the group consisting essentially of:

4                   (a)     determine a concentration of particles collected on the regenerable solid  
5 collection surface, and to activate an air sampler to obtain a sample of particles from the same general  
6 volume of air that provided the particles originally deposited on the regenerable solid collection  
7 surface;

8                   (b)     activating an air sampler to obtain a sample of particles from the same general  
9 volume of air that provided the particles originally deposited on the regenerable solid collection  
10 surface, if the means for analyzing the spot of immobilized airborne particles indicates that the  
11 particles collected on the regenerable solid collection surface are potentially harmful to biological  
12 organisms;

13                  (c)     determine a concentration of particles collected on the regenerable solid  
14 collection surface, and to activate an analysis device to collect and analyze a sample of particles from  
15 the same general volume of air that provided the particles originally deposited on the regenerable  
16 solid collection surface; and

17                  (d)     activating an air analysis device to obtain and analyze a sample of particles  
18 from the same general volume of air that provided the particles originally deposited on the  
19 regenerable solid collection surface, if the means for analyzing the spot of immobilized airborne  
20 particles indicates that the particles collected on the regenerable solid collection surface are  
21 potentially harmful to biological organisms.

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1           37. (Previously Presented) The method of Claim 21, further comprising the steps of:

2                   (a)     comparing the concentration of immobilized airborne biological particles  
3 against predetermined criteria indicative of a potential alarm condition; and

4                   (b)     if the concentration of immobilized airborne biological particles equals or  
5 exceeds the predetermined criteria, responding by implementing at least one step selected from the  
6 group of steps consisting essentially of:

7                           (i)     activating an alarm signal directed to alert a designated party;

8                           (ii)    manipulating an air management component;

9                           (iii)   producing a warning signal;

10                          (iv)   activating an air sampler to collect a sample of particles from the same  
11 general area that provided the airborne particles deposited on the regenerable solid collection surface;  
12 and

13                          (v)    moving a damper in an air duct.

14           38. (Previously Presented) The method of Claim 21, wherein the step of regenerating the  
15 collection surface comprises at least one step selected from the group of steps consisting essentially  
16 of:

17                   (a)     brushing the regenerable solid collection surface, to dislodge the particles  
18 deposited on the regenerable solid collection surface;

19                   (b)     pressing a pad against the regenerable solid collection surface while there is  
20 relative motion between the pad and the regenerable solid collection surface, to remove the particles  
21 deposited on the regenerable solid collection surface;

22                   (c)     pressing a wheel against the regenerable solid collection surface while there is  
23 relative motion between the wheel and the regenerable solid collection surface, to remove the  
24 particles deposited on the regenerable solid collection surface;

25                   (d)     directing a stream of high velocity air towards the regenerable solid collection  
26 surface to dislodge the particles deposited on the regenerable solid collection surface;

27                   (e)     electrostatically charging the regenerable solid collection surface to  
28 electrostatically disperse the particles deposited on the regenerable solid collection surface; and

29                   (f)     directing energy to the particles collected upon the regenerable solid collection  
30 surface to dislodge the particles deposited on the regenerable solid collection surface.

39-43. (Canceled)

44. (Currently Amended) The device according to ~~Claim 43~~ Claim 48, where the particle counter is capable of reporting a present value of particle counts in at least one predetermined size range.

45. (Currently Amended) The device according to ~~Claim 35~~ Claim 52, wherein the additional component comprises at least one component selected from the group consisting essentially of an adjacently positioned aerosol sampler and an adjacently positioned aerosol analyzer.

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1           46. (Previously Presented) An air sensor device configured to collect airborne particles and  
2 to evaluate collected airborne particles in order to determine if the collected airborne particles  
3 indicate the presence of a biological threat, comprising:

4                   (a)     a regenerable solid collection surface means for supporting a spot of  
5 immobilized airborne particles, and for removing particles from an air stream by impaction of the air  
6 stream against the regenerable solid collection surface;

7                   (b)     a surface regenerator for automatically regenerating the regenerable solid  
8 collection surface by removing particles from the regenerable solid collection surface, such that once  
9 regenerated, the regenerable collection solid surface can collect additional particles from the air, such  
10 that particles collected before regenerating the regenerable solid collection surface are substantially  
11 no longer present to contaminate particles collected after the regeneration, the surface regenerator  
12 comprising at least one structure selected from a group consisting of:

13                           (i)     a brush that regenerates the regenerable solid collection surface by  
14 brushing away particles that were collected on the regenerable solid collection surface;

15                           (ii)    a pad that regenerates the regenerable solid collection surface by  
16 pressing against the regenerable solid collection surface while the pad and the regenerable solid  
17 collection surface move relative to each other, so as to remove particles that were collected on the  
18 regenerable solid collection surface; and

19                           (iii)   a wheel coupled to a motor that regenerates the regenerable solid  
20 collection surface by pressing against the regenerable solid collection surface while the motor rotates  
21 the wheel, so as to remove particles that were collected on the regenerable solid collection surface;  
22 and

23                   (c)     sensing means for determining if the spot of immobilized airborne particles  
24 represents a biological threat.

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1           47. (Currently Amended) A method of detecting airborne biological particles, the method  
2 comprising the steps of:

3           (a)     depositing airborne particles on a regenerable solid collection surface provided  
4 for supporting a spot of immobilized airborne particles, such that the particles deposited on the  
5 regenerable solid collection surface form a spot;

6           (b)     subsequently, measuring a biological signature present in the particles  
7 comprising the spot, using a detector configured for sensing the biological signature of the particles,  
8 while the particles remain deposited on the regenerable solid collection surface;

9           (c)     determining a concentration of the immobilized airborne biological particles  
10 from the measurement of the biological signature in order to determine if the biological particles  
11 should be considered to represent a potential biological threat; and

12           (d)     regenerating the regenerable solid collection surface by removing particles  
13 from the regenerable solid collection surface after step (c), so that once thus regenerated, the  
14 regenerable solid collection surface can collect additional particles from the air, such that particles  
15 collected before regeneration of the regenerable surface are substantially no longer present to  
16 contaminate particles collected after the regeneration, wherein the step of regenerating comprises at  
17 least one step selected from the group of steps consisting essentially of:

18                   (i)     pressing a pad against the regenerable solid collection surface while  
19 there is relative motion between the pad and the regenerable solid collection surface, to remove the  
20 particles deposited on the regenerable solid collection surface;

21                   (ii)    pressing a wheel against the regenerable solid collection surface while  
22 there is relative motion between the wheel and the regenerable solid collection surface, to remove the  
23 particles deposited on the regenerable solid collection surface;

24                   (iii)   directing a stream of high velocity air towards the regenerable solid  
25 collection surface to dislodge the particles deposited on the regenerable solid collection surface;

26                   (iv)    electrostatically charging the regenerable solid collection surface to  
27 electrostatically disperse the particles deposited on the regenerable solid collection surface; and

28                   (v)     directing energy to the particles collected upon the regenerable solid  
29 collection surface to dislodge the particles deposited on the regenerable solid collection surface.

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1           48. (Currently Amended) An air sensor device configured to collect airborne particles and to  
2 evaluate collected airborne particles in order to determine if the collected airborne particles indicate  
3 the presence of a biological threat, comprising:

4                 a regenerable solid collection surface for supporting a spot of immobilized airborne  
5 particles, the regenerable solid collection surface being specifically configured to remove particles  
6 from an air stream by impaction of the air stream against the regenerable solid collection surface;

7                 means for regenerating the regenerable solid collection surface by removing particles  
8 from the regenerable solid collection surface without removing the regenerable solid collection  
9 surface from the air sensor device, such that once regenerated, the regenerable collection solid  
10 surface can collect additional particles from the air, such that particles collected before regenerating  
11 the regenerable solid collection surface are substantially no longer present to contaminate particles  
12 collected after regeneration; ~~and~~

13                 means for analyzing the spot of immobilized airborne particles while the particles  
14 remain disposed on the regenerable solid collection surface without removing the regenerable solid  
15 collection surface from the air sensor device, to determine if the spot of immobilized airborne  
16 particles represents a biological threat; and

17                 a particle counter configured to determine an amount of airborne particles.

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1           49. (New) An air sensor device configured to collect airborne particles and to evaluate  
2 collected airborne particles in order to determine if the collected airborne particles indicate the  
3 presence of a biological threat, comprising:

4                 a regenerable solid collection surface for supporting a spot of immobilized airborne  
5 particles, the regenerable solid collection surface being specifically configured to remove particles  
6 from an air stream by impaction of the air stream against the regenerable solid collection surface;

7                 a spotting nozzle configured to direct the air stream towards the regenerable solid  
8 collection surface, such that a resulting impact of the air stream with the regenerable solid collection  
9 surface produces the spot of immobilized airborne particles on the regenerable solid collection  
10 surface;

11                means for regenerating the regenerable solid collection surface by removing particles  
12 from the regenerable solid collection surface, such that once regenerated, the regenerable collection  
13 solid surface can collect additional particles from the air, such that particles collected before  
14 regenerating the regenerable solid collection surface are substantially no longer present to  
15 contaminate particles collected after regeneration; and

16                means for analyzing the spot of immobilized airborne particles while the particles  
17 remain disposed on the regenerable solid collection surface to determine if the spot of immobilized  
18 airborne particles represents a biological threat.

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1           50. (New) An air sensor device configured to collect airborne particles and to evaluate  
2 collected airborne particles in order to determine if the collected airborne particles indicate the  
3 presence of a biological threat, comprising:

4                 a regenerable solid collection surface for supporting a spot of immobilized airborne  
5 particles, the regenerable solid collection surface being specifically configured to remove particles  
6 from an air stream by impaction of the air stream against the regenerable solid collection surface;

7                 means for regenerating the regenerable solid collection surface by removing particles  
8 from the regenerable solid collection surface, such that once regenerated, the regenerable collection  
9 solid surface can collect additional particles from the air, such that particles collected before  
10 regenerating the regenerable solid collection surface are substantially no longer present to  
11 contaminate particles collected after regeneration, wherein said means for regenerating the  
12 regenerable solid collection surface comprises at least one element selected from the group consisting  
13 essentially of:

14                         (a)     a nozzle configured to direct a stream of high velocity air towards the  
15 regenerable solid collection surface to dislodge the particles deposited thereon;

16                         (b)     a blade configured to scrape the regenerable solid collection surface to  
17 dislodge the particles deposited thereon;

18                         (c)     means for electrostatically charging the regenerable solid collection  
19 surface, so that a static charge disperses the particles that were deposited thereon;

20                         (d)     means for directing energy to the particles collected upon the  
21 regenerable solid collection surface to dislodge the particles deposited thereon; and

22                         (e)     means for directing energy to the regenerable solid collection surface to  
23 dislodge the particles deposited thereon; and

24                 means for analyzing the spot of immobilized airborne particles while the particles  
25 remain disposed on the regenerable solid collection surface to determine if the spot of immobilized  
26 airborne particles represents a biological threat.

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1           51. (New) A method of detecting airborne biological particles, the method comprising:  
2                 depositing airborne particles on a regenerable solid collection surface provided for  
3 supporting a spot of immobilized airborne particles, such that the particles deposited on the  
4 regenerable solid collection surface form a spot;  
5                 measuring a biological signature present in the particles comprising the spot, using a  
6 detector configured for sensing the biological signature of the particles, while the particles remain  
7 deposited on the regenerable solid collection surface, the biological signature comprising an  
8 autofluorescence;  
9                 determining a concentration of the immobilized-airborne biological particles from the  
10 measurement of the biological signature in order to determine if the biological particles should be  
11 considered to represent a potential biological threat; and  
12                 regenerating the regenerable solid collection surface by removing particles from the  
13 regenerable solid collection surface, such that once thus regenerated, the regenerable solid collection  
14 surface can collect additional particles from the air, and such that particles collected before  
15 regeneration of the regenerable surface are substantially no longer present to contaminate particles  
16 collected after the regeneration.

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1           52. (New) An air sensor device configured to collect airborne particles and to evaluate  
2 collected airborne particles in order to determine if the collected airborne particles indicate the  
3 presence of a biological threat, comprising:

4                 a regenerable solid collection surface for supporting a spot of immobilized airborne  
5 particles, the regenerable solid collection surface being specifically configured to remove particles  
6 from an air stream by impaction of the air stream against the regenerable solid collection surface;

7                 means for regenerating the regenerable solid collection surface by removing particles  
8 from the regenerable solid collection surface, such that once regenerated, the regenerable collection  
9 solid surface can collect additional particles from the air, such that particles collected before  
10 regenerating the regenerable solid collection surface are substantially no longer present to  
11 contaminate particles collected after regeneration;

12                means for analyzing the spot of immobilized airborne particles while the particles  
13 remain disposed on the regenerable solid collection surface to determine if the spot of immobilized  
14 airborne particles represents a biological threat; and

15                a processor configured to implement at least one function selected from the group  
16 consisting essentially of:

17                         (a)     producing an alarm signal if the means for analyzing the spot of  
18 immobilized airborne particles indicates that the particles collected on the regenerable solid  
19 collection surface are potentially harmful to biological organisms;

20                        (b)     activating at least one additional component if the means for analyzing  
21 the spot of immobilized airborne particles indicates that the particles collected on the regenerable  
22 solid collection surface are potentially harmful to biological organisms; and

23                        (c)     determining a concentration of biological particles collected on the  
24 regenerable solid collection surface, and activating an alarm signal if the processor determines that  
25 the concentration of biological particles on the regenerable solid collection surface exceeds a  
26 predetermined value.

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1           53. (New) An air sensor device configured to collect airborne particles and to evaluate  
2 collected airborne particles in order to determine if the collected airborne particles indicate the  
3 presence of a biological threat, comprising:

4                 a regenerable solid collection surface for supporting a spot of immobilized airborne  
5 particles, the regenerable solid collection surface being specifically configured to remove particles  
6 from an air stream by impaction of the air stream against the regenerable solid collection surface;

7                 means for regenerating the regenerable solid collection surface by removing particles  
8 from the regenerable solid collection surface, such that once regenerated, the regenerable collection  
9 solid surface can collect additional particles from the air, such that particles collected before  
10 regenerating the regenerable solid collection surface are substantially no longer present to  
11 contaminate particles collected after regeneration;

12                means for analyzing the spot of immobilized airborne particles while the particles  
13 remain disposed on the regenerable solid collection surface to determine if the spot of immobilized  
14 airborne particles represents a biological threat; and

15                a processor coupled to the means for analyzing the spot of immobilized airborne  
16 particles, the processor being logically configured to implement at least one function selected from  
17 the group consisting essentially of:

18                         (a)     determine a concentration of particles collected on the regenerable solid  
19 collection surface, and to activate an air sampler to obtain a sample of particles from the same general  
20 volume of air that provided the particles originally deposited on the regenerable solid collection  
21 surface;

22                         (b)     activating an air sampler to obtain a sample of particles from the same  
23 general volume of air that provided the particles originally deposited on the regenerable solid  
24 collection surface, if the means for analyzing the spot of immobilized airborne particles indicates that  
25 the particles collected on the regenerable solid collection surface are potentially harmful to biological  
26 organisms;

27                         (c)     determine a concentration of particles collected on the regenerable solid  
28 collection surface, and to activate an analysis device to collect and analyze a sample of particles from  
29 the same general volume of air that provided the particles originally deposited on the regenerable  
30 solid collection surface; and



1 (d) activating an air analysis device to obtain and analyze a sample of  
2 particles from the same general volume of air that provided the particles originally deposited on the  
3 regenerable solid collection surface, if the means for analyzing the spot of immobilized airborne  
4 particles indicates that the particles collected on the regenerable solid collection surface are  
5 potentially harmful to biological organisms.  
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